

Atty. Docket No.: SRRF.P216.US.C1

Patent 10/600,174

IN THE CLAIMS

Please amend the claims as indicated below.

1           1.       (original) A global positioning system (GPS) receiver system, comprising:  
2           a GPS clock that is calibrated to GPS time when the GPS receiver system is  
3       navigating using GPS satellite data, wherein the GPS clock is configured to be turned off  
4       when the GPS receiver system is not navigating;  
5           a real time clock (RTC) that uses significantly less power than the GPS clock,  
6       wherein the RTC is configured to keep time when the GPS clock is turned off;  
7           a brownout detection circuit coupled to the RTC, wherein the brownout detection  
8       circuit is configured to,  
9                receive an RTC clock signal;  
10               detect a loss of RTC clock cycles; and  
11               output an RTC status signal that indicates a loss of RTC clock cycles above  
12       a predetermined threshold.

1           2.       (original) The GPS receiver system of claim 1, wherein the brownout  
2       detection circuit comprises:  
3           a detection circuit that receives the RTC clock signal and determines whether the  
4       RTC clock is losing cycles, wherein the detection circuit is calibrated to determine  
5       whether a loss of cycles is above the predetermined threshold; and  
6           a status circuit that stores a signal output by the detection circuit and outputs a  
7       status signal indicating the RTC clock is one of GOOD and NOT GOOD.

1           3.       (original) The GPS receiver system of claim 2, wherein the detection  
2       circuit comprises a resistor-capacitor (RC) time constant component with a predetermined  
3       time constant, wherein the RC time constant component receives the RTC clock signal  
4       and outputs a decayed voltage, wherein a level of the decayed voltage indicates whether  
5       the loss of cycles is above the predetermined threshold.

Atty. Docket No.: SIRF.P216.US.C1

Patent 10/600,174

1           4.       (original) The GPS receiver of claim 3, further comprising a navigation  
2 processor coupled to receive the status signal, wherein the navigation processor  
3 determines whether to use the RTC clock for acquisition of satellites based on the status  
4 signal.

1           5.       (original) The GPS receiver system of claim 4, further comprising an edge  
2 aligned ratio counter (EARC) coupled to the RTC and to the GPS clock, wherein, on start-  
3 up of the GPS receiver system for satellite acquisition, time kept by the RTC clock is  
4 transferred to the GS clock using the EARC, and wherein the transferred RTC time is used  
5 for acquisition if the status signal indicates the RTC is GOOD.

1           6.       vA system for global positioning system (GPS) navigation comprising:  
2 a baseband chip; and  
3 a radio frequency (RF) chip, wherein the RF chip and the baseband chip are  
4 coupled through an interface, and wherein the RF chip comprises:  
5 a GPS clock that is calibrated to GPS time when the GPS receiver system is  
6 navigating using GPS satellite data, wherein the GPS clock is configured to be turned off  
7 when the GPS receiver system is not navigating;  
8 a real time clock (RTC) that uses significantly less power than the GPS clock,  
9 wherein the RTC is configured to keep time when the GPS clock is turned off; and  
10 a brownout detection circuit coupled to the RTC, wherein the brownout detection  
11 circuit is configured to detect a loss of RTC clock cycles.

1           7.       (original) The system of claim 6, wherein the RF chip further comprises:  
2 a temperature sensor coupled to the RTC; and  
3 an analog to digital (A/D) converter coupled to the temperature sensor.

1           8.       (original) The system of claim 7, wherein the baseband chip comprises:  
2 a navigation processor coupled to receive signals from the RF chip through the  
3 interface, including an RTC status signal that indicates whether the RTC clock signal  
4 should be used for satellite acquisition;

Atty. Docket No.: SIRF.P216.US.C1

Patent 10/600,174

5 an edge aligned ratio counter (EARC) coupled to receive a GPS clock signal and  
6 the RTC clock signal and configured to align respective GPS and RTC clock signals with  
7 a high degree of accuracy, and to transfer time kept by the RTC clock to the GPS clock;  
8 and  
9 a memory device coupled to the A/D converter and to the RTC, and configured to  
10 store a table relating temperature to frequency for the RTC clock.

1 9. (original) The system of claim 7, wherein the brownout detection circuit  
2 comprises:

3 a detection circuit that receives the RTC clock signal and determines whether the  
4 RTC clock is losing cycles, wherein the detection circuit is calibrated to determine  
5 whether a loss of cycles is above the predetermined threshold; and

6 a status circuit that stores a signal output by the detection circuit and outputs a  
7 status signal indicating the RTC clock is one of GOOD and NOT GOOD.

1 10. (original) The system of claim 9, wherein the detection circuit comprises a  
2 resistor-capacitor (RC) time constant component with a predetermined time constant,  
3 wherein the RC time constant component receives the RTC clock signal and outputs a  
4 decayed voltage, wherein a level of the decayed voltage indicates whether the loss of  
5 cycles is above the predetermined threshold.

1 11. (original) The system of claim 7, wherein the interface comprises a serial  
2 peripheral interface.

1 12. (original) The system of claim 8, wherein the navigation processor sends a  
2 command via the interface to the brownout detection circuit requesting a status of the  
3 RTC, and wherein the brownout detection circuit responds by sending an RTC status via  
4 the interface.

1 13. (original) A system for global positioning system (GPS) navigation  
2 comprising:

Atty. Docket No.: SIRF.P216.US.C1

Patent 10/600,174

3 a radio frequency (RF) chip, wherein the RF chip comprises a GPS clock that is  
4 calibrated to GPS time when the GPS receiver system is navigating using GPS satellite  
5 data, wherein the GPS clock is configured to be turned off when the GPS receiver system  
6 is not navigating; and

7 a baseband chip, wherein the baseband chip and the RF chip are coupled through a  
8 system interface, and wherein the baseband chip comprises,

9 a real time clock (RTC) that uses significantly less power than the GPS  
10 clock, wherein the RTC is configured to keep time when the GPS clock is turned off; and

11 a brownout detection circuit coupled to the RTC, wherein the brownout  
12 detection circuit is configured to detect a loss of RTC clock cycles.

1 14. (original) The system of claim 13, wherein the baseband chip further  
2 comprises:

3 a temperature sensor coupled to the RTC; and

4 an analog to digital (A/D) converter coupled to the temperature sensor.

1 15. (original) The system of claim 14, wherein the baseband chip further  
2 comprises an edge aligned ratio counter (EARC) coupled to receive a GPS clock signal  
3 and the RTC clock signal and configured to align the respective clock signals with a high  
4 degree of accuracy, and to transfer time kept by the RTC clock to the GPS clock.

1 16. (original) The system of claim 15, wherein the baseband chip is coupled to  
2 a processor and a memory through a peripheral interface, wherein:

3 the memory device is coupled to the A/D/ converter and to the RTC, and is  
4 configured to store a table relating temperature to frequency for the RTC clock; and

5 the processor is configured to receive signals through the peripheral interface,  
6 including an RTC status signal that indicates whether the RTC clock signal should be used  
7 for satellite acquisition.

1 17. (original) The system of claim 13, wherein the brownout detection circuit  
2 comprises:

Atty. Docket No.: SIRF.P216.US.C1

Patent 10/600,174

3 a detection circuit that receives the RTC clock signal and determines whether the  
4 RTC clock is losing cycles, wherein the detection circuit is calibrated to determine  
5 whether a loss of cycles is above the predetermined threshold; and  
6 a status circuit that stores a signal output by the detection circuit and outputs a  
7 status signal indicating the RTC clock is one of GOOD and NOT GOOD.

1 18. (original) The system of claim 17, wherein the detection circuit comprises  
2 a resistor-capacitor (RC) time constant component with a predetermined time constant,  
3 wherein the RC time constant component receives the RTC clock signal and outputs a  
4 decayed voltage, wherein a level of the decayed voltage indicates whether the loss of  
5 cycles is above the predetermined threshold.

1 19. (original) The system of claim 13, wherein the system interface comprises  
2 a serial peripheral interface.

1 20. (original) The system of claim 16, wherein the processor sends a command  
2 via the peripheral interface to the brownout detection circuit requesting a status of the  
3 RTC, and wherein the brownout detection circuit responds by sending an RTC status  
4 signal via the peripheral interface.

1 21. (currently amended) An apparatus for detecting a loss of clock cycles in a  
2 clock signal generating device, the apparatus comprising:  
3 a detection circuit that receives ~~the~~ a clock signal from the clock signal generating  
4 device, and determines whether the clock signal generating device is losing cycles,  
5 wherein the detection circuit is calibrated to determine whether a loss of cycles is above  
6 the predetermined threshold; and  
7 a status circuit that stores a signal output by the detection circuit and outputs a  
8 status signal indicating the clock signal generating device is one of GOOD and NOT  
9 GOOD.

1 22. (original) The apparatus of claim 21, wherein the detection circuit  
2 comprises a resistor-capacitor (RC) time constant component with a predetermined time

Atty. Docket No.: SIRF.P216.US.C1

Patent 10/600,174

3 constant, wherein the RC time constant component receives the clock signal and outputs a  
4 decayed voltage, wherein a level of the decayed voltage indicates whether the loss of  
5 cycles is above the predetermined threshold.

1 23. (original) The apparatus of claim 22, wherein:  
2 the status circuit comprises a latch device; and  
3 the detection circuit further comprises a voltage comparator coupled to latch  
4 device, wherein the voltage comparator compares the decayed voltage and a reference  
5 voltage and outputs a result signal that resets the latch when the loss of cycles is above the  
6 predetermined threshold.

1 24. (original) A method of determining a status of a real time clock (RTC) in a  
2 global positioning system (GPS) receiver, the method comprising:  
3 receiving an RTC clock signal in a detection circuit;  
4 detecting when the RTC is losing clock signals such that the loss of clock cycles is  
5 above a predetermined threshold;  
6 storing the status of the RTC, wherein the status is one of GOOD and NOT  
7 GOOD;  
8 if the loss of clock cycles is above the predetermined threshold, setting the status  
9 of the RTC to bad; and  
10 before using the RTC clock signal for acquiring satellites, checking the status of  
11 the RTC.

1 25. (original) The method of claim 24, wherein detecting comprises receiving  
2 the RTC clock signal in a resistor-capacitor (RC) circuit with a calculated RC time  
3 constant such that when the loss of clock cycles is above the predetermined threshold, an  
4 output voltage of the RC circuit decays below a predetermined level.

1 26. (original) The method of claim 25, wherein storing the status comprises  
2 storing a status bit based on the output voltage level of the RC circuit, wherein a first logic  
3 value of the status bit indicates GOOD and a second logic value of the status bit indicates  
4 "bad.

Atty. Docket No.: SIRF.P216.US.C1

Patent 10/600,174

1           27.   (original) The method of claim 26, further comprising, on start-up of the  
2   GPS receiver, setting the status bit to indicate GOOD during an interval when the RTC is  
3   powering up.

1           28.   (original) The method of claim 27, further comprising:  
2           on start-up of the GPS receiver, transferring time kept by the RTC to a GPS clock  
3   using an edge aligned ratio counter (EARC);  
4           checking the status of the RTC; and  
5           if the status of the RTC is GOOD, using the transferred time to acquire satellites.